

**Water Body Fact Sheets for 2002  
Section 303(d) List Update  
Lahontan Region**

***SURPRISE VALLEY  
HYDROLOGIC UNIT***

**California Regional Water Quality Control Board, Lahontan Region  
2501 Lake Tahoe Boulevard  
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**UPPER ALKALI LAKE, SALINITY/TDS/CHLORIDES**  
**2002 303(d) Fact Sheet**  
**Delisting**

**Rationale for Delisting**

Upper Alkali Lake is located in Surprise Valley in eastern Modoc County. It is proposed for delisting because it is a desert playa lake whose high salinity and high trace element levels are due to natural processes such as input from geothermal springs and concentration by evaporation over geologic time. Salts and trace elements coming entirely from natural sources are not “pollutants” as defined in the Clean Water Act. Table 1 summarizes available water quality data for Upper Alkali Lake.

**Table 1. Water Quality of Upper Alkali Lake, from California Department of Water Resources (1960).** Units are parts per million (ppm). “TDS” means “Total Dissolved Solids.”

<b>Sampling date</b>	<b>TDS (ppm)</b>	<b>pH</b>	<b>Sulfate (ppm)</b>	<b>Chloride (ppm)</b>	<b>Boron (ppm)</b>	<b>Fluoride (ppm)</b>	<b>Arsenic (ppm)</b>
9-17-53	8340	9.3	467	3380	49	9.0	0.27
12-2-58	10100	9.3	561	4020	48	7.7	0.7
12-2-58	9900	9.3	555	3950	46	8.0	0.7
5-5-54	8850	9.3	535	3880	50	7.8	0.7
5-5-54	5840	9.1	333	2150	24	7.9	0.18
8-5-57	7570	8.8	446	3080	49	7.2	-

The “percent sodium” for all samples in Table 1 was 99 percent or greater.

Some of the values in Table 1 exceed drinking water Maximum Contaminant Levels (MCLs). However, the Alkali Lakes are not designated for the Municipal and Domestic Supply (MUN) beneficial use. Because of their poor quality and ephemeral nature, they are unlikely to be in demand for domestic supply in the future.

The California Department of Water Resources data in Table 1, above, are the most comprehensive set available. No biological data are available, but Upper Alkali Lake is assumed to support the saline aquatic habitat and wildlife habitat uses of other California playa lakes when water is present. (See the fact sheet for Middle Alkali Lake.) As indicated in Lahontan Regional Board staff’s (2000) literature review on inland saline lakes and geothermal springs, such waters support aquatic life and wildlife adapted to their unique extreme environmental conditions, and these waters should not be considered “impaired” for biological uses because chemical concentrations exceed normal freshwater criteria. The U.S. Environmental Protection Agency’s (USEPA’s) 1997 guidance for the development of site specific aquatic life criteria states: *“For aquatic life uses, where the natural background concentration for a specific parameter is documented, by definition that concentration is sufficient to support the level of aquatic life expected to occur naturally at the site absent any interference by humans.”*

## **Upper Alkali Lake, Salinity/TDS/Chlorides 2002 303(d) Fact Sheet, Page 2**

### **Watershed Characteristics**

Upper Alkali Lake is one of three large ephemeral playa lakes in Surprise Valley, a closed drainage basin in eastern Modoc County. The Alkali Lakes are remnants of Pleistocene Lake Surprise. The areas and volumes of the Alkali Lakes vary from year to year with precipitation and runoff, and the concentrations of salts vary accordingly. They receive freshwater inputs from streams draining the east slope of the Warner Mountains, and there are a number of ephemeral tributaries originating near the California-Nevada border. The Alkali Lakes also receive input from geothermal springs, which themselves have high concentrations of sulfate, boron, fluoride, and sodium, and arsenic.

### **Information Sources**

California Department of Water Resources, 1960. *Water Quality Investigation, Surprise Valley.*

California Department of Water Resources, 1963. *Northeastern Counties Ground Water Investigation*, Volume I, Bulletin No. 98.

California Department of Water Resources, 1970. Arsenic in Wells in Northeastern California. Memorandum from Bruce Wormald dated December 11, 1970.

California Regional Water Quality Control Board, Central Valley Region, 2000. *A Compilation of Water Quality Goals.*

California Regional Water Quality Control Board, Lahontan Region, 1995. *Water Quality Control Plan for the Lahontan Region.*

California Regional Water Quality Control Board, Lahontan Region, 2000. *Use Attainability Analysis for Nine "Naturally Impaired" Waters of the Lahontan Region*, April 2000.

California Regional Water Quality Control Board, Lahontan Region, 2001. *Staff Report on Recommended Changes to Lahontan Region's Section 303(d) List of Impaired Water Bodies.*

U. S. Environmental Protection Agency, 1997. Establishing Site Specific Aquatic Life Criteria Equal to Natural Background. Memorandum dated November 5, 1997 from Tudor T. Davies, Director, Office of Science and Technology, USEPA Office of Water.

**MIDDLE ALKALI LAKE, SALINITY/TDS/CHLORIDES**  
**2002 303(d) Fact Sheet**  
**Delisting**

**Rationale for Delisting**

Middle Alkali Lake is located in Surprise Valley in eastern Modoc County. It is proposed for delisting because it is a desert playa lake whose high salinity and high trace element levels are due to natural sources such as input from geothermal springs and concentration by evaporation in an internally drained basin over geologic time. Salts and trace elements coming entirely from natural sources are not “pollutants” as defined in the Clean Water Act. Table 1 summarizes available chemical water quality data for Middle Alkali Lake.

**Table 1. Water Quality of Middle Alkali Lake, from California Department of Water Resources (1960).** Units are parts per million (ppm). “TDS” means “Total Dissolved Solids.”

<b>Sampling Date</b>	<b>TDS (ppm)</b>	<b>pH</b>	<b>Sulfate (ppm)</b>	<b>Chloride (ppm)</b>	<b>Boron (ppm)</b>	<b>Fluoride (ppm)</b>	<b>Arsenic (ppm)</b>
12-2-58	17500	9.4	1560	6810	94	14	1.8
7-17-56	3310	8.9	302	1180	20	5.9	0.4
9-17-53	6150	9.2	510	2380	31	9.0	0.21
8-7-57	11100	8.8	808	4480	64	11	-
5-5-54	8160	9.1	576	3330	38	6.0	0.39

The percent sodium value for all samples in Table 1 was 99% or greater.

Some of the values in Table 1 exceed drinking water maximum contaminant levels (MCLs). However, the Alkali Lakes are not designated for the Municipal and Domestic Supply (MUN) beneficial use and, because of their poor quality and ephemeral nature, are unlikely to be in demand for domestic supply in the future.

Patterson and Jacobson (1984) studied Middle Alkali Lake, which, as a result of a wet El Nino year, had a mean depth of 1 meter and was used by hundreds of birds of about 70 species for foraging, loafing, or breeding. Fairy shrimp, tadpole shrimp, copepods, daphnia, and brine flies were present. . The specific conductivity of the lake ranged from 10170 in December 1982 to 356 in May 1983. The lake was estimated to hold a minimum of 30,000 acre feet of water in 1982; however, the authors noted that it still dries up almost every year.

As indicated in Lahontan Regional Board staff’s literature review on inland saline lakes and geothermal springs, such waters support aquatic life and wildlife adapted to their unique extreme environmental conditions, and these waters should not be considered “impaired” for biological uses because chemical concentrations exceed normal freshwater criteria. The USEPA’s (1997) guidance for the development of site specific aquatic life criteria states: *“For aquatic life uses, where the natural background concentration for a specific parameter is documented, by definition that concentration is sufficient to support the level of aquatic life expected to occur naturally at the site absent any interference by humans.”*

**Middle Alkali Lake, Salinity/TDS/Chlorides  
2002 303(d) Fact Sheet, Page 2**

**Watershed Characteristics**

Middle Alkali Lake is one of three large ephemeral playa lakes in Surprise Valley, a closed drainage basin, in eastern Modoc County. The Alkali Lakes are remnants of Pleistocene Lake Surprise. The areas and volumes of the Alkali Lakes vary from year to year with precipitation and runoff, and the concentrations of salts vary accordingly. They receive freshwater inputs from streams draining the east slope of the Warner Mountains, and there are a number of ephemeral tributaries originating near the California-Nevada border. The Alkali Lakes also receive input from geothermal springs, which themselves have high concentrations of sulfate, boron, fluoride, and sodium, and arsenic.

**Information Sources**

California Department of Water Resources, 1960. *Water Quality Investigation, Surprise Valley*

California Department of Water Resources, 1963. *Northeastern Counties Ground Water Investigation, Volume I*, Bulletin No. 98.

California Department of Water Resources, 1970. Arsenic in Wells in Northeastern California. Memorandum from Bruce Wormald dated December 11, 1970.

California Regional Water Quality Control Board, Central Valley Region, 2000. *A Compilation of Water Quality Goals*.

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California Regional Water Quality Control Board, Lahontan Region, 2000. *Use Attainability Analysis for Nine "Naturally Impaired" Waters of the Lahontan Region*.

California Regional Water Quality Control Board, Lahontan Region, 2001. *Staff Report on Recommended Changes to Lahontan Region's Section 303(d) List of Impaired Water Bodies*.

Patterson, D.W. and S.L. Jacobson, 1984. *1983 Surprise Valley Ground Water Recharge Field Study Report*. U.S. Soil Conservation Service, Red Bluff, CA.

U. S. Environmental Protection Agency, 1997. Establishing Site Specific Aquatic Life Criteria Equal to Natural Background. Memorandum dated November 5, 1997 from Tudor T. Davies, Director, Office of Science and Technology, USEPA Office of Water.

**LOWER ALKALI LAKE, SALINITY/TDS/ CHLORIDES**  
**2002 303(d) Fact Sheet**  
**Delisting**

**Rationale for Delisting**

Lower Alkali Lake is located in Surprise Valley in eastern Modoc County. It is proposed for delisting because desert playa lake whose high salinity and high trace element levels are due to natural sources such as input from geothermal springs and concentration by evaporation in an internally drained basin over geologic time. Salts and trace elements coming entirely from natural sources are not “pollutants” as defined in the Clean Water Act. Table 1 summarizes available chemical water quality data for Lower Alkali Lake.

**Table 1. Water Quality of Lower Alkali Lake, from California Department of Water Resources (1960).** Units are parts per million (ppm). “TDS” means “Total Dissolved Solids.”

<b>Sampling Date</b>	<b>TDS (ppm)</b>	<b>Ph</b>	<b>Sulfate (ppm)</b>	<b>Chloride (ppm)</b>	<b>Boron (ppm)</b>	<b>Fluoride (ppm)</b>	<b>Arsenic</b>
12-2-58	13400	9.5	1230	4840	57	27	1.1
12-2-58	12300	9.5	1070	4540	52	25	0.8
8-7-57	11300	8.9	4260	4260	56	25	-

Some of the values in Table 1 exceed drinking water Maximum Contaminant Levels. However, the Alkali Lakes are not designated for the Municipal and Domestic Supply (MUN) beneficial use, and because of their poor quality and ephemeral nature, are not likely to be in demand for domestic supply in the future.

The California Department of Water Resources data in Table 1, above, are the most comprehensive set available. No biological data are available, but Lower Alkali Lake is assumed to support the saline aquatic habitat and wildlife habitat uses of other California playa lakes when water is present. (See the fact sheet for Middle Alkali Lake.)

The U.S. Environmental Protection Agency’s (USEPA’s) 1997 guidance for the development of site specific aquatic life criteria states: *“For aquatic life uses, where the natural background concentration for a specific parameter is documented, by definition that concentration is sufficient to support the level of aquatic life expected to occur naturally at the site absent any interference by humans.”*

**Watershed Characteristics**

Lower Alkali Lake is one of three large ephemeral playa lakes in Surprise Valley, a closed drainage basin, in eastern Modoc County. The Alkali Lakes are remnants of Pleistocene Lake Surprise. The areas and volumes of the Alkali Lakes vary from year to year with precipitation and runoff, and the concentrations of salts vary accordingly. They receive freshwater inputs from

**Lower Alkali Lake, Salinity/TDS/Chlorides**  
**2002 303(d) Fact Sheet, Page 2**

streams draining the east slope of the Warner Mountains, and there are a number of ephemeral tributaries originating near the California-Nevada border. The Alkali Lakes also receive input from geothermal springs, which themselves have high concentrations of sulfate, boron, fluoride, and sodium, and arsenic.

**Information Sources**

California Department of Water Resources, 1960. *Water Quality Investigation, Surprise Valley.*

California Department of Water Resources, 1963. *Northeastern Counties Ground Water Investigation, Volume I*, Bulletin No. 98.

California Department of Water Resources, 1970. Arsenic in Wells in Northeastern California. Memorandum from Bruce Wormald dated December 11, 1970.

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U. S. Environmental Protection Agency, 1997. Establishing Site Specific Aquatic Life Criteria Equal to Natural Background. Memorandum dated November 5, 1997 from Tudor T. Davies, Director, Office of Science and Technology, USEPA Office of Water.